

REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections contained in the Office Action of March 26, 2004 is respectfully requested.

The Examiner has rejected claims 41-80 under 35 U.S.C. § 103(a) as being unpatentable over the Applicants' Admitted Prior Art (AAPA) of figure 8 in view of the Vo reference (USP 6,603,269). However, independent claims 41, 56, 57 and 72 have been amended as indicated above, while dependent claim 75 has been cancelled and new dependent claim 81 has been added. Thus, for the reasons discussed below, it is respectfully submitted that claims 41-74 and 76-81 are clearly patentable over the prior art or record.

A description of the invention as recited in the amended claims will now be provided with reference to the drawings and specification of the present application. However, reference to the particular embodiments of the present application is provided for illustrative purposes only, and is not intended to otherwise limit the scope of the claims and any specific embodiment(s).

Independent method claim 41 and independent apparatus claim 57 have both now been amended to recite that the plasma source is *spaced apart* from the dielectric tube, and this feature is shown in, for example, the embodiment illustrated in Figure 1. In particular, as illustrated in Figure 1, the plasma source including the antenna 5, the insulative cover 12, and the dielectric plate 11 is *spaced apart* from the dielectric tube (i.e., dielectric bushing) 17. This feature is important in order to overcome the problems discussed in paragraphs [0005] and [0006] of the substitute specification. Specifically, plasma generated by the plasma source deteriorates the metal body to which the dielectric tube is attached, and this deterioration is particularly applicable to areas around the dielectric tube because gas used to generate the plasma is supplied through a hole in the dielectric tube. However, because the plasma source is *spaced apart* from the dielectric tube, through which gas for plasma generation enters the vacuum chamber, the likelihood that the metal body or the area of the vacuum chamber surrounding the dielectric tube will be deteriorated due to the plasma is significantly reduced.

In the Office Action, the Examiner acknowledged that the AAPA does not disclose or even suggest a dielectric tube through which gas is introduced into an interior of a vacuum chamber. Nonetheless, the Examiner asserts that the Vo reference teaches a dielectric tube 14 attached to a metal body 13 fixed to a vacuum chamber 4, and that one of ordinary skill in the art would be motivated by the Vo reference to modify the AAPA reference in order to obtain the present invention. However, independent claims 41 and 57 have now been amended as discussed above, and it is submitted that the combination of the AAPA reference and the Vo reference does not disclose or even suggest the invention as recited in amended independent claims 41 and 57, as explained below.

In particular, the Vo reference teaches a remote plasma source 10 (illustrated in Figure 1), in which gas enters a plasma chamber 12 through an inlet 21, and plasma is generated within the plasma chamber 12 by microwaves emitted to the gas within plasma chamber 12 by a microwave generator 2 via a wave guide 11. The plasma generated within plasma chamber 12 then enters the main body of vacuum chamber 4 through the plasma outlet port 23.

As noted above, the Examiner asserted that the Vo reference discloses a dielectric tube 14 which allegedly corresponds to the dielectric tube of the present invention through which gas is introduced into an interior of a vacuum chamber. However, as clearly illustrated in Figure 1 of the Vo reference, the dielectric tube 14 actually forms an inner wall of the plasma chamber 12, and does not comprise a dielectric tube for introducing a gas into an interior of the vacuum chamber. In this regard, it appears that the inlet port 21 of the first lid 20 performs the same function as the dielectric tube of the present invention, but the material of the inlet port 21 is not discussed in the Vo reference.

Moreover, as explained in column 1, lines 23 through 53 of the Vo reference, the microwave generator 2, the wave guide 11, and the plasma chamber 12 including the dielectric tube 14 form the plasma source in the Vo reference. Thus, it is not possible for the dielectric tube 14, which forms a portion of the plasma source, to also be *spaced apart* from the plasma source, as recited in amended independent claims 41 and 57.

As explained above, the AAPA and the Vo reference do not, either alone or in combination, disclose or suggest a plasma processing method and apparatus as recited in amended independent claims 41 and 57, in which gas is introduced into an interior of a vacuum chamber through a hole in a dielectric tube, and in which a plasma source is *spaced apart* from the dielectric tube. Therefore, one of ordinary skill in the art would not be motivated to modify or combine the references so as to obtain the invention recited in amended independent claims 41 and 57. Accordingly, it is respectfully submitted that amended independent claims 41 and 57, and the claims that depend therefrom, are clearly patentable over the prior art of record.

Independent method claim 56 and independent apparatus claim 72 have both been amended to recite that the dielectric tube through which the gas is introduced protrudes by an amount in a range of 0.5 mm to 20 mm from a surface of the metal body or the facing electrodes. This feature is illustrated in, for example, Figure 2, and is discussed in paragraphs [0080] and [0083]. In particular, allowing the dielectric tube to protrude at least 0.5 mm from a surface of the metal body or the facing electrode has been determined to sufficiently weaken high-frequency electric fields at the outlet of the dielectric tube, so as to suppress formation of damaging hollow cathode discharge. On the other hand, limiting the protrusion to no more than 20 mm will prevent breakage of the dielectric tube.

As noted above, the Examiner acknowledges that the AAPA does not disclose or suggest a dielectric tube through which gas is introduced into the interior of a vacuum chamber as recited in independent claims 56 and 72. However, the Examiner asserts that the Vo reference discloses a dielectric tube 14, as illustrated in Figure 1. However, the Vo reference does not disclose or suggest a dielectric tube through which gas is introduced into a vacuum chamber, in which the dielectric tube protrudes by an amount in a range of 0.5 mm to 20 mm from a surface of a metal body or a facing electrode. In fact, the dielectric tube 14 disclosed in the Vo reference does not protrude *any* distance from a surface.

As explained above, the AAPA and the Vo reference do not, either alone or in combination, disclose or suggest a dielectric tube through which gas is introduced into a vacuum chamber, which

protrudes by an amount in a range of 0.5 mm to 20 mm from a surface of a metal body or a facing electrode. Therefore, one of ordinary skill in the art would not be motivated to modify or combine the references so as to obtain the invention recited in amended independent claims 56 and 72. Accordingly, it is respectfully submitted that amended independent claims 56 and 72, and the claims that depend therefrom, are clearly patentable over the prior art of record.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicant's undersigned representative.

Respectfully submitted,

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